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TECHNICAL ACTIVITIES

* INTRODUCTION *

Prepared by:

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AUG 1988

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EXECUTIVE SUMMARY

BACKGROUND OF THE ALMRS PROJECT

The ALMRS-GIS Project Office of the Denver Service Center has the responsibility of developing the LIS for the BLM. This project has been expanded from the original concept of ALMRS to include Technical Activities and possible future incorporation of Resource Activities. The automation of LIS will improve the efficiency with which the BLM processes cases, responds to management and public queries, and produces reports and stats for management. The LIS will also enhance both the uniformity and accessibility of data across organizational boundaries.

In January of 1988, a BLM management decision was made to gather GCDB requirements. Systems analysts personnel from DSC met with personnel in Oregon representing ASO, ESO and OSO to begin an interview process that would gather inform-regarding Cadastral Survey, Engineering, and Mapping Sciences. Upon returning to Denver after three (3) weeks of interviews, the analysts drafted a review document using notes from Oregon. After publication of the first draft document, the following groups met in April at the DSC to review each document:

- CSO, ESO, ASO, OSO - Cadastral Survey
- DSC, MSO, OSO - Engineering
- DSS, NMSO, WSO - Mapping Sciences

After thorugh review and editing, BLM-DCS, along with NSR, produced a final Technical Activities document that will give a better overall understanding of the technical activities of the Bureau as well as lend support to the designer of the Target System for LIS.

PURPOSE OF THE SERIES

The ALMRS-GIS requirements baseline documents describe the current method by which BLM Technical Activities interface with the Lands and Minerals case processing and GCDB. These documents were prepared to define the current system, as the first stage in the development of the System Specification and the Statement of Work for procurement of the LIS. The current system definition and predicted workloads form the basis to model a future automated system that accurately reflects how BLM conducts business.

SCOPE OF THE SERIES

The series selected by the ALMRS-GIS Project Office to model the current Technical Activity process consists of four volumes:

a. Volume 1 - **Introduction** - Describes the format and content of the volumes that comprise the Technical Activity series.

b. Volume 2 - **Cadastral Survey** - Describes the function of Cadastral Survey and how it interfaces to and supports other activities of the BLM.

c. Volume 3 - **Mapping Sciences** - Describes the function of Mapping Sciences and how it interfaces to and supports other BLM activities.

d. Volume 4 - **Engineering** - Describes the function of that activity and how it interfaces to and supports other activities of the BLM.

The structured systems analysis techniques used to document the current system model are DFD's (data flow diagrams), IPO's (processing narratives), and data dictionaries. The DFD's show the flow of data through the system (i.e., the sources and the destinations of data and the processes that use, create, or modify data). Processing narratives or IPO's accompany the most detailed level of the DFD's to explain the step by step processing in a given procedure. The data dictionaries consist of the data elements used on the DFD's and discussed in the narratives. A detailed description of these structured tools is provided in Chapter 3 of this Introduction volume.

CHAPTER 1

INTRODUCTION

1.1 SCOPE OF THE INTRODUCTION VOLUME

Volume 1 is organized as follows:

a. The **Executive Summary** describes the background of the ALMRS project; explains the purpose of the LIS requirements documents; and identifies the scope, original use, and future utility of the series.

b. Chapter 1 - **Introduction** - Identifies the scope and structure of this document and of the series of documents.

c. Chapter 2 - **Processing Overviews** - Summarizes the contents of the Technical Activities volume, which include Cadastral Survey, Mapping Sciences, and Engineering.

d. Chapter 3 - **Structured Analysis Standards and Conventions** - Explains the analysis techniques used in the series to document the current method of performing Technical Activity functions.

1.2 SCOPE OF THE SERIES

The volumes in the ALMRS series document current operations and functions of Technical Activities. The series, selected by the ALMRS-GIS Project Office, consists of four volumes;

a. Volume 1 - **Introduction** - Describes the format and contents of volumes which comprise the Technical Activities series.

b. Volume 2 - **Cadastral Survey** - Describes the function of Cadastral Survey and how it supports other BLM activities.

c. Volume 3 - **Mapping Sciences** - Describes the function of Mapping Sciences and how it supports other BLM activities.

d. Volume 4 - **Engineering** - Describes the function of the Engineering activity within the BLM and how it supports other Bureau activities.

1.3 FORMAT OF THE SERIES

Volume 1 - **Introduction** - Format tailored to the specific content of the respective volume.

Volumes 2 thru 4 describe the processing that occurs in the Technical Activity functions. Structured analysis techniques were applied to abstract the required information through on-site interviews and research and to subsequently present the information in the volumes of the series. Therefore the format of these volumes is consistent in presenting information through DFD's, process lists, IPO's, and data dictionaries. Refer to Chapter 3 of this volume for an explanation of these analysis tools.

CHAPTER 2

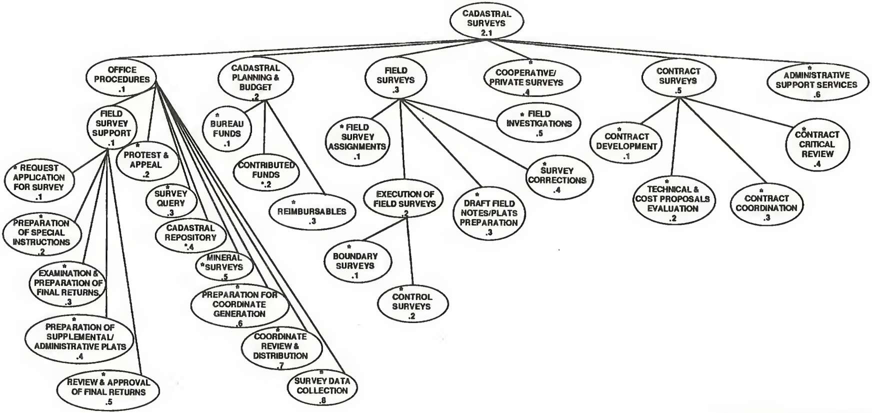
PROCESSING OVERVIEWS

The processing overviews contained in this chapter are extracts from the introduction to Cadastral Survey, Mapping Sciences, and Engineering. A visual table of contents (VTOC) follows each extract to graphically illustrate the hierarchical structure of the specific processes described in the corresponding document.

2.1 CADASTRAL SURVEY

Cadastral Survey describes the current system for processing surveys of land pursuant directives 43 U.S.C. 2; 25 U.S.C. 29 and 30; and 43 U.S.C 52-60, 751-775 and 1364. Land surveying is the determination of boundaries and areas of tracts of land. Land boundaries are usually defined by ownership, commencing with the earliest owners through successive ownerships and partitions. Land surveying includes the re-establishment of original boundaries and the establishment of such new boundaries as may be required due to special BLM requests, statutory requirements, or reimbursable requests.

CADASTRAL SURVEYS VISUAL TABLE OF CONTENTS

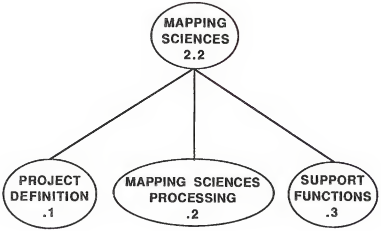

CADASTRAL SURVEYS 2.1
OFFICE PROCEDURES .1
FIELD SURVEY SUPPORT .1
* REQUEST APPLICATION FOR SURVEY .1
* PREPARATION OF SPECIAL INSTRUCTIONS .2
* EXAMINATION & PREPARATION OF FINAL RETURNS .3
* PREPARATION OF SUPPLEMENTAL/ ADMINISTRATIVE PLATS .4
* REVIEW & APPROVAL OF FINAL RETURNS .5
* PROTEST & APPEAL .2
* SURVEY QUERY .3
CADASTRAL REPOSITORY *.4
*MINERAL SURVEYS .5
* PREPARATION FOR COORDINATE GENERATION .6
* COORDINATE REVIEW & DISTRIBUTION .7
* SURVEY DATA COLLECTION .8
CADASTRAL PLANNING & BUDGET .2
* BUREAU FUNDS .1
CONTRIBUTED FUNDS *.2
* REIMBURSABLES .3
FIELD SURVEYS .3
* FIELD SURVEY ASSIGNMENTS .1
EXECUTION OF FIELD SURVEYS .2
* BOUNDARY SURVEYS .1
* CONTROL SURVEYS .2
* DRAFT FIELD NOTES/PLATS PREPARATION .3
* SURVEY CORRECTIONS .4
* FIELD INVESTIGATIONS .5
* COOPERATIVE/ PRIVATE SURVEYS .4
CONTRACT SURVEYS .5
* CONTRACT DEVELOPMENT .1
* TECHNICAL & COST PROPOSALS EVALUATION .2
* CONTRACT COORDINATION .3
* CONTRACT CRITICAL REVIEW .4
* ADMINISTRATIVE SUPPORT SERVICES .6

CADASTRAL VTOC (CADASTRAL SURVEY) 6/8/88 TMB

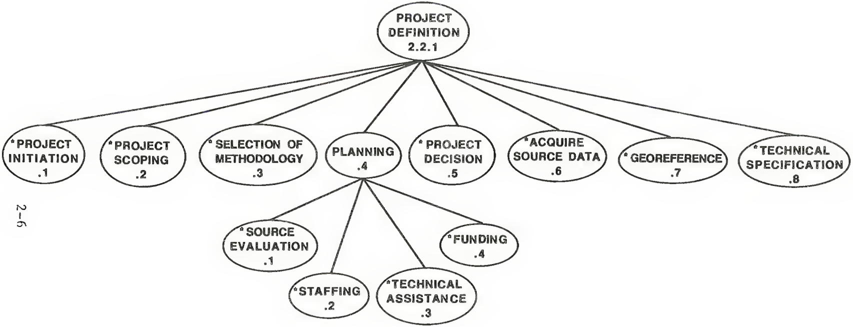
2.2 MAPPING SCIENCES

The main focus of Mapping Sciences is: Photogrammetry, Remote Sensing, and Cartography. Photogrammetry is the science or art of obtaining reliable measurements by means of photographs or photographic images. Remote Sensing is the blanket coverage of a specific area for special vegetation types. This activity involves the use of photographic and earth resource satellite tools to gather information. Cartography is art, science, and technology of making maps. This activity is concerned with all stages of evaluation, compilation, design, and forms of basic data.

MAPPING SCIENCES VISUAL TABLE OF CONTENTS



MAPPING SCIENCES VISUAL TABLE OF CONTENTS (CONT)



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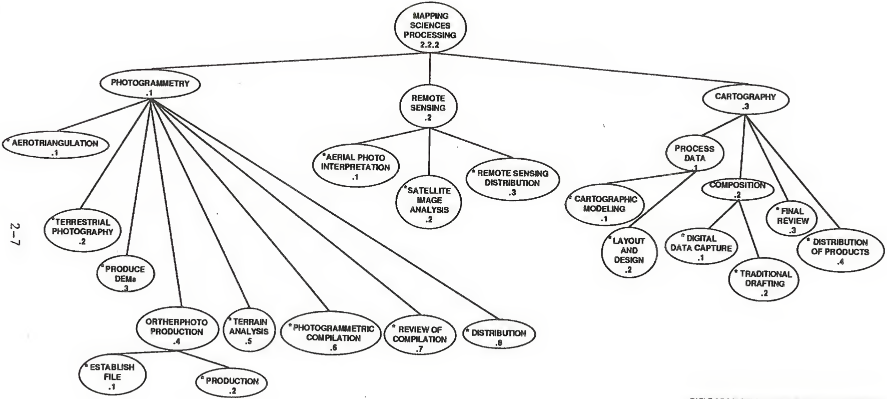

MAPPING SCIENCES PROCESSING 2.2.2
PHOTOGRAMMETRY .1
* AEROTRIANGULATION .1
*TERRESTRIAL PHOTOGRAPHY .2
*PRODUCE DEMs .3
ORTHERPHOTO PRODUCTION .4
* ESTABLISH FILE .1
* PRODUCTION .2
*TERRAIN ANALYSIS .5
*PHOTOGRAMMETRIC COMPILATION .6
* REVIEW OF COMPILATION .7
* DISTRIBUTION .8
REMOTE SENSING .2
*AERIAL PHOTO INTERPRETATION .1
*SATELLITE IMAGE ANALYSIS .2
* REMOTE SENSING DISTRIBUTION .3
CARTOGRAPHY .3
PROCESS DATA .1
* CARTOGRAPHIC MODELING .1
*LAYOUT AND DESIGN .2
COMPOSITION .2
* DIGITAL DATA CAPTURE .1
* TRADITIONAL DRAFTING .2
* FINAL REVIEW .3
* DISTRIBUTION OF PRODUCTS .4

TABLE OF CONTENTS-3 (MAPPING SCIENCES) 6/2/88 MB

MAPPING SCIENCES VISUAL TABLE OF CONTENTS (CONT)

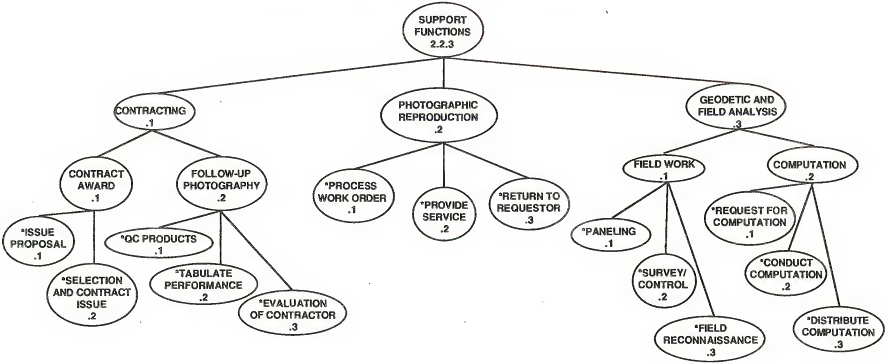


TABLE OF CONTENTS-4 (MAPPING SCIENCES) 6/2/88 MB

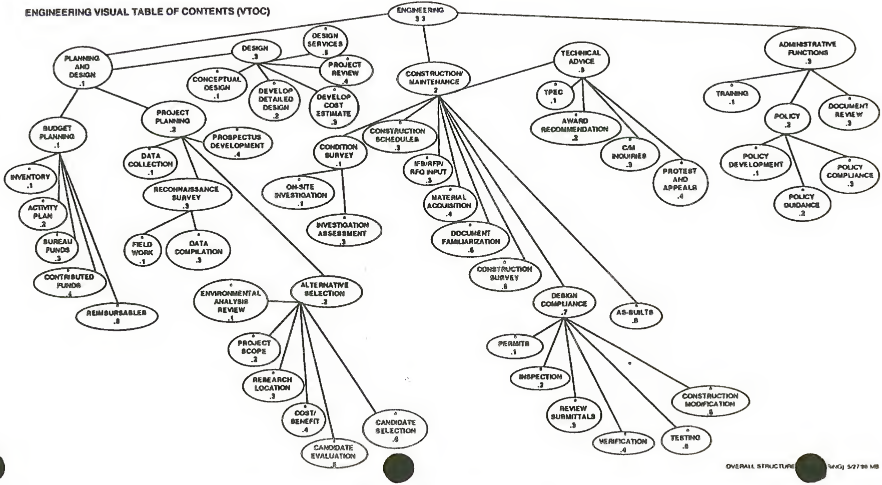
2.3 ENGINEERING

The main elements of Engineering are Planning and Design, Construction/Maintenance, and Administrative Functions. Planning and Design is the function that allows projects to be planned, funded, and designed from their inception to final product. The major elements of this functionality are Budget Planning, Project Planning, and Design.

Construction/Maintenance is the function that allows projects to be constructed or maintained. The major elements of this function are Condition Surveys, Technical Advice, and Design Compliance.

Administrative Functions are those functions that directly support Engineering design, planning, and construction. The areas of support are Training, Policy, and Document Review.

ENGINEERING VISUAL TABLE OF CONTENTS (VTOC)



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CHAPTER 3

STRUCTURED ANALYSIS STANDARDS AND CONVENTIONS

As appropriate, each activity document contains a Visual Table of Contents (VTOC), Data Flow Diagrams (DFD's), a Process List, Input/Process/Output narratives (IPO's), and a Data Dictionary and Cross Reference List.

3.1 Visual Table of Contents (VTOC)

A VTOC diagram, consisting of the process ellipses in hierarchical order, precedes the detailed data flow diagrams in each document. The VTOC enables the reader to view the levels of processes (by decimalized numbers) and their interrelationships.

3.2 Data Flow Diagrams (DFD's)

The DFD's form the basis for portraying the results of the structured analysis which was performed to define how the BLM performs Technical Activities. DFD's are used to show the flow of data through a system, identifying the data items; the processes that create, use, or modify data items; and the sources and destinations of the data. The DFD shows only the flow of data and not its control. Although a DFD shows all potential paths for data flow, it does not indicate data flow frequency or quantity, nor what initiates the various processes or selects the paths. The DFD shows the partitioning of the system into logical elements and can be decomposed to succeedingly lower levels.

Figure 3.1 illustrates the data flow diagram symbols used in the ALMRS documents.

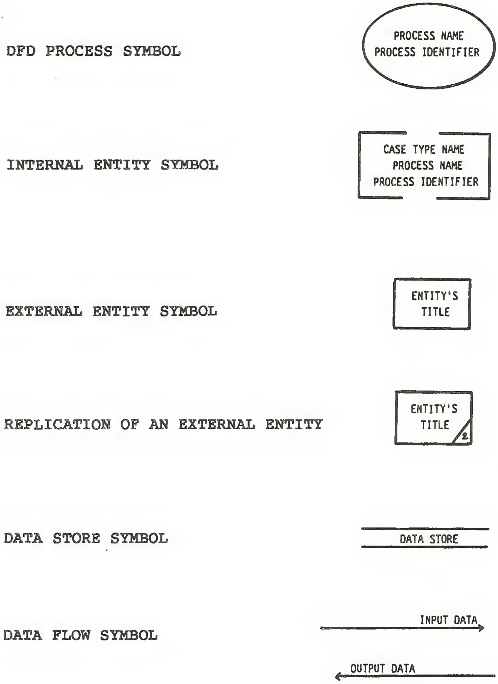

Figure 3-1. Data Flow Diagram Symbols

An ellipse represents a process where incoming data is acted on, producing some type of output data. Within the ellipse appear the process name and the process identifier represented by a decimalized number. Processes at a higher level can be decomposed into a network of lower level processes in subsequent hierarchical breakdowns. The numeric process identifier shows the path taken through the process hierarchy to arrive at the process. For example, the process identifier 2.1.4 identifies the fourth process in the decomposition of process 2.1 and 2.1 identifies the first process in the decomposition of process 2.
The highest level process is assigned a whole number (e.i. 2); first level of decomposition is a level 2 (e.i. 2.1); the next level of decomposition is a level 3 (e.i. 2.1.4), etc.

When it is no longer useful to decompose a process further, the process is said to be "at a primitive level". An asterisk by the process name indicates that the process is at the primitive level. No more decomposition will take place within that specific DFD. Primitive processes are completely described in a detailed narrative.
Brackets represent processes that are defined elsewhere in the hierarchical structure of the DFD's, yet share a data flow with a process defined in the current system diagram. In other words, the internal entity is an off-page connector. Each set of brackets contains the name of the process being referenced. The process may appear within that Technical Activity or within another Technical Activity. If the process within the brackets is at a primitive level, the numeric identifier is included to ease in identification.

A rectangle identifies agencies, organizations, or systems outside of the system being presented. These external entities act as original inputs and outputs of data. Each external entity is labeled with the entity's title or designation. A diagonal line is drawn from the top to the left side of the rectangle to identify an external entity which is an automated system. If the same external entity is used more than once on a diagram, a diagonal line is drawn from the right side to the bottom of the rectangle and a number inserted in the resulting triangle. The number entered indicates which occurrence of the external entity this symbol represents.

A pair of horizontal lines represent a data store. This is generally a logical grouping of data rather that individual records or components.

Lines and arrows represent data flowing between processes, internal entities, and data stores. Each data flow is labeled with the name or abbreviation of the data that is either input or output to a process.

The arrow at the beginning or end of a line indicates the flow of data either into or out from a process or entity. The entity may be external or internal to the system being defined.

3.3 PROCESS LISTS

Each Technical Activity volume contains a process list. This list is alphabetical and includes the level of the process and the DFD reference page. If the process is at the primitive level, the page numbers on which the IPO's narratives begin begins is also provided.

3.4 INPUT/PROCESS/OUTPUT NARRATIVES (IPO's)

The IPO's describe the detail processing done at the primitive level as illustrated in the data flow diagrams (DFD's). Included in each narrative is the following information:

a. the process name;

b. the identifier or the process number;

c. the parent process name;

d. a general description of the process;

e. any applicable policies and/or procedures;

f. any constraints that might affect processing;

g. the IPO narrative.

The process narratives appear in the order they are defined in the data flow diagrams (DFD's) in Chapter 2 of the volume. The narrative describes the logical order of execution within the process.

3.5 DATA DICTIONARY AND CROSS REFERENCE LIST

The data dictionary lists all data flows specified on the DFD's in alphabetical order by name. Each data dictionary entry includes;

a. data name;

b. mnemonic or abbreviation, if applicable;

c. description of the data uses and characteristics;

d. data type (i.e., set; record; data aggregate; and element)

e. security considerations for both retrieval and update;

f. definition (used primarily for composite data).

The data definition uses the following standard notation to describe the composition of the data and to identify its components:

a.	data1 + data2	multiple components
b.	[data1 ¦ data 2]	selection of components
c.	(data)	optional components
d.	$data	primitive components (e.g. elements not further described elsewhere in the data dictionary)
e.	{ data }	repetitive components
f.	1{ data}10	repetitive components within limits
g.	* comment *	qualifying comments
h.	"data"	literal data

A cross reference list is included at the end of the chapter if any data dictionary entry has a mnemonic or abbreviation associated with its actual name. This list of abbreviations (and full data dictionary names) may be used to quickly find a data flow in the dictionary when it is referenced on the DFD only by its mnemonic.